

INTRODUCTION

Chemical laboratories by their nature may contain many hazards to health and to the environment, however the risk of injury to people or of harm to the environment may be substantially reduced by following appropriate rules and guidelines.

This S.O.P. outlines rules and guidelines that need to be adhered to for any operations undertaken using Manchester Analytical Geochemistry Unit facilities in the Geochemistry Laboratory 1.18. These apply as well as any further precautions that may be required for specific procedures.

HAZARDS

Chemical hazards in these laboratories include but are not restricted to: corrosive liquids (such as strong acids or bases) including hydrofluoric acid, (highly) flammable solvents, (very) toxic and carcinogenic substances, strong oxidisers, highly reactive chemicals, radioactive substances and chemical irritants.

Physical hazards include but are not restricted to: microwave heated and pressurised concentrated corrosive acids, compressed gases, hot ovens and hotplates and electrical hazards.

PROCEDURES

These procedures are subdivided by (1) Scope, (2) General Rules and Guidelines, (3) Precautions & Emergency Procedures Related to Corrosive Liquids, (4) Instruments & Apparatus, (5) Emergency Procedures in Case of Fire, (6) Storage of Chemicals and (7) Waste Management.

Appendices include : (A1) Laboratory Induction Checklist, (A2) Record of Health & Safety Declarations; (A3) Log of Chemicals Introduced; (A4) Log of Chemical Disposed (A5) COSHH Compliance Check-List: Storage, (A6) Information Sources.

1. Scope

(a) NEW USERS

All new users of these facilities must consult with the designated responsible persons (Mr. P. Lythgoe & Dr. D. Polya) or their designates, Mr. T. Jenson & Mrs. C. Davies, before commencing any work. New users will be asked to provide relevant training records and if necessary attend a suitable training course before beginning work. All new users will be provided with a brief induction to the laboratory.

(b) ALL USERS

All users must abide by University and School safety policy and guidelines and follow good laboratory practice as well as abiding by and agreeing to abide by this laboratory code of practice:

2. General Rules & Guidelines

- 2.1 Safety glasses must be worn at all times. The wearing of contact lenses is discouraged.
- 2.2 A suitable laboratory coat must be worn at all times.
- 2.3 No smoking or drinking or eating or application of cosmetics is permitted.
- 2.4 Think, act and encourage safe, considerate and responsible behaviour.
- 2.5 If you become aware of any situation that would reasonably be considered to be a serious danger to health & safety then you must inform the laboratory staff.
- 2.6 All users must log in when using the facilities and must also lodge the relevant COSHH forms in the file provided before commencing work.
- 2.7 You must conduct a suitable risk assessment and have identified and assured means for the proper storage and disposal/removal before introducing to the laboratory any chemicals, reagent mixtures or other substances hazardous to health.
- 2.8 Do not start any work or procedure until you (i) have had reviewed by an appropriate COSHH supervisor a relevant COSHH risk assessment, (ii) know the safety rules and procedures applicable to your work. **IF YOU DON'T KNOW, ASK!** and (iii) have lodged the completed COSHH risk assessment in the laboratory file.
- 2.9 Minimise exposure to chemicals and particularly hazardous chemicals. This involves amongst other measures (i) planning experiments to reduce quantities of chemicals used and where appropriate substituting less hazardous reagents, (ii) avoiding inhalation of gases and fine powder, (iii) avoiding skin contact with chemicals and (iv) using fume hoods where appropriate.
- 2.10 Areas where you work must be kept clean and tidy. This includes (a) clearly labelling all chemicals & reagent mixtures; (b) immediately cleaning up any spilled chemicals; (c) appropriate storage of chemicals (long-term storage on bench-tops is to be avoided); (d) appropriate disposal of wastes; & (e) appropriate cleaning & return of apparatus and disposal of all chemicals & reagent mixtures upon final termination of work in the laboratory.
- 2.10 Emergency procedures to be followed in the event of an accident are posted in the laboratories and mentioned below. Emergency procedures for particular experiments should be posted by the experiment in the case for overnight operations or in the relevant COSHH form lodged in the file provided.
- 2.12 As soon as possible after any accident, ensure that an accident report is completed and sent to the responsible persons named above.
- 2.13 Wash your hands well with cold water before leaving the laboratory.

2.14

Room 1.18 is designated containment facility for materials imported under **DEFRA Plant Health Licence PHL 181/5762 (01/2008)**. As such, all personnel working in this room are required to be familiar with terms of the licence and the standard operating procedures pertaining the handling these materials, irrespective of whether or not they are using such licensed material.

3. Precautions & Emergency Procedures Related to Corrosive Liquids

In these laboratories, the most common (but by no means only) chemical hazards are corrosive liquids such as concentrated acids and alkalis, which produce burns on contact with body tissue and some of which also give off noxious fumes.

Routine precautions:

3.1 Always wear suitable eye or face protection, gloves and protective clothing when using concentrated acids or alkalis.

3.2 Hydrofluoric acid (HF) is particularly dangerous because, unlike other concentrated acids, contact with the skin does not produce an immediate burning sensation. After being absorbed through the skin it affects the tissue, including bone, causing severe pain and if neglected irreversible damage.

If you intend to use hydrofluoric acid then do not commence work until you have received detailed instructions from Mr. T. Jenson or Mrs. C. Davies and have ensured that there is a supply of calcium gluconate gel (stored in the cabinet to the right of the chemistry laboratory entrance and also near the microwave digestion oven).

3.3 Fuming substances, e.g. concentrated solutions of hydrofluoric acid (HF), hydrochloric acid (HCl) and nitric acid (HNO₃) should be dispensed or heated only in an efficient fume cupboard, with the extractor fan running.

3.4 Due to the large amount of heat produced when concentrated sulphuric acid (H₂SO₄) is mixed with water, dilution of sulphuric acid should only be carried out by the slow addition, with stirring, of the acid to a borosilicate glass beaker containing the appropriate amount of water. It is recommended that the addition be carried out with the beaker partly immersed in a large volume of cold water to dissipate the heat.

3.5 All work with hydrofluoric and perchloric acid must only be carried out within the two designated fume cupboards equipped with 'scrubbers'. If you are not sure which fume cupboard to use, **ask**.

Emergency procedures:

3.6 Spillage on body or clothing

a) Remove affected clothing and wash off affected part of the body with copious amounts of cold water, using hand held eye wash/decontamination water hose (by the sink on the island bench). **There is an eye wash/decontamination water hose connected to a tap and mounted by the sink by the main entrance to room 1.18.**

b) Dry the skin.

c) **In case of the contact with hydrofluoric acid or other soluble fluorides wash and dry the affected areas and massage calcium gluconate gel (stored in the cabinet to the right of the chemistry laboratory entrance and also near the microwave digestion oven) into the affected skin.**

d) Obtain advice from the person in charge of the laboratory as soon as possible.

3.7 Splashes in the eyes.

Wash liberally with water (eye wash provided), then seek expert advice.

3.8 Mouth Contact

Wash out mouth with water without swallowing. Consult the person in charge of the laboratory.

3.9 Swallowing

Consult the person in charge of the laboratory immediately.

3.10 Spillage on the bench or floor.

Seek advice from person in charge of the laboratory.

It is usually safe to sweep or mop up small spillages after neutralisation if necessary.

Major acid spills can be neutralised by sprinkling calcium carbonate over the affected area.

4. Instruments and Apparatus

These include: balances, fume cupboards, furnaces, refrigerators, ovens, deionisers, microwave digester, hotplates, water baths, pH, Eh, conductivity and specific ion electrodes as well as a variety of glassware and other items.

Routine precautions;

a) Instruments can only be used by prior arrangement with the person in charge of the instrument (in most cases this will be the same as person in charge of the laboratory)

b) If you don't know how to use an instrument properly then don't use it. Seek advice.

c) Carefully follow all the instructions posted near individual instruments or

appliances or as directed.

d) When practicable, switch off at night all electrical appliances and instruments which you are using unless otherwise indicated in the instructions or by the person in charge of the laboratory. If an appliance is to be left on, leave a signed and dated note beside it.

e) Ensure that all gas cylinders are secured by the straps or clamps provided and that the valves are closed when they are not in use.

f) Place broken glassware in the special container provided. Other waste must not be placed in this container.

g) The microwave digestion apparatus should not be used without explicit instructions from Mr. P. Lythgoe or Mr. T. Jenson

5. Emergency Procedures in Case of Fire

a) If possible, turn off any gas or electrical appliances and extinguish flames by using the extinguishers.

b) If this fails to stop the fire immediately, close the laboratory doors and sound the alarm in the corridor to initiate further action and to remove all personnel from the area.

6. Storage of Chemicals

Before bringing chemicals & reagent mixtures into the laboratory

6.1. Before any chemical or reagent mixture is brought into the laboratory, the user must establish

- (i) that there exists suitable, safe storage for it (see below)
- (ii) that a hazard data sheet for the chemical(s) is available
- (iii) that they have the means to ethically and responsibly dispose of the substance; you are responsible for the suitable disposal of all chemicals and substances that you introduce into the laboratory
- (iv) that the chemical or reagent mixture and the quantity of it are appropriate for the purpose for which they are intended to be used; long term storage of hazardous unused chemicals or reagent mixtures is strongly discouraged.
- (v) all introduction of material that have been imported under a DEFRA licence or SHOULD HAVE BEEN imported under a DEFRA licence must be clearly labelled as such; furthermore notification of such introduction must be made to the Persons Responsible for the SEAES DEFRA Plant Health Licence.[Currently Professor Jon Lloyd & Dr David Polya]

Bringing chemicals & reagent mixtures into the laboratory

6.2. For all chemicals & reagent mixtures brought into the laboratory,

- (i) the user's name must be clearly labelled on the container
- (ii) the hazard data sheet for the chemical must be lodged in the laboratory file
- (iii) the details of the chemical (name, amount, hazard, user, date introduced, date to be disposed of) must be entered into the laboratory inventory
- (iv) if the chemical falls into any one of the following categories: a category 1 or 2 carcinogen, highly flammable, peroxidisable, explosive, radioactive, a compressed gas (other than air for the TOC or the mercury analyser), a biohazard, contains asbestos or of unknown hazard, then the laboratory staff must be informed.

Exemption: Such detailed labelling and inclusion on the laboratory inventory are not required for materials that are introduced and removed from the laboratory on the same day (for example for weighing, acidification or other treatment) AND which are not left unattended AND which do not fall into any of the hazard categories in (iv) above AND which are not disposed of through the laboratory.

Labelling chemicals & reagent mixtures

6.3. All chemicals must be labelled in accordance with good laboratory practice. Chemical labels should indicate the name of the substance, user, date of introduction to the laboratory or date of preparation, and required hazard warnings.

Exemption: For solutions or other materials that are to be prepared and disposed of on the same day and which are not left unattended, such detailed labelling is not required.

Note the requirement to clearly label any samples imported under a DEFRA Plant Health Licence.

Storing chemicals & reagent mixtures

6.4. All chemicals must be stored in a safe manner in accordance with good laboratory practice. If chemicals are stored in personal cupboards then suitable hazard warnings must be displayed on these cupboards.

6.5. No hazardous chemicals should be stored above eye-level.

6.6. No chemicals or reagent mixtures should be stored on the floor of the laboratory.

6.7. It should be ensured that incompatible chemicals such as nitric acid & glacial acetic acid, or perchloric acid & sulphuric acid, or flammables and oxidisers, or strong acids and strong bases (these are just few examples) are kept separate.

6.8. Notwithstanding the above, the storage of any chemicals should comply with the following guidelines:

Flammable solvents, such as acetone, ethanol and glacial acetic acid, must be stored in the designated metal, electrically earthed storage cabinet for flammable liquids and must be kept separated from oxidizing materials. Large quantities (< 5 litres) or reagents that are not required for long periods of time should be transferred to the solvent store.

Non-flammable solvents, such as carbon tetrachloride, ethylene glycol and mineral oil, must be stored in a cabinet (this may be the same as that for flammable liquids) and separated from oxidizing materials.

Organic acids, such as acetic acid, must be stored in a cabinet and separated from oxidizing materials, caustics, cyanides and sulfides and from mineral acids.

Mineral acids, such as nitric acid, hydrochloric acid and sulfuric acid, must be stored in a cabinet of ideally non-combustible materials and separated from oxidizing materials, caustics, cyanides and sulfides.

Caustics, such as ammonium hydroxide, ammonia and sodium hydroxide, must be stored in a dry area and separated from acids.

Water reactive chemicals must be stored in a cool, dry location and separated from aqueous solutions and protected from fire sprinkler water (if we had a laboratory modern enough to have one).

Oxidizers must be stored in cabinet of non-combustible material and separated from flammable and combustible materials including non-flammable solvents.

Compressed gases, must be stored in a well-ventilated area and must be suitably secured. Non-oxidising gases such as nitrogen, hydrogen and carbon dioxide, must be separated from oxidizing compressed gases, such as oxygen, chlorine, and nitrous oxide.

Non-volatile, non-reactive solids that do not present a toxicity or carcinogenicity hazard may be stored in cabinets or open shelves.

Toxic and carcinogenic chemicals must be locked up.

Radioactive materials must be locked up in a metal cabinet.

7. Waste Management.

This section outlines the system for minimisation and ethical and responsible disposal of wastes from the Chemistry Laboratory Rooms 1.18 & 1.25.

The system involves the following steps: (1) reducing generation of hazardous waste (2) identification of hazardous wastes (3) classification of waste (4) temporary storage of waste and (5) ethical and responsible disposal of waste

7.1 Minimising Generation of Hazardous Waste

In order to minimise the volume of chemical wastes generated (and hence the environmental impact and cost), planning should be carried out by individual workers before purchasing or obtaining chemicals or other materials and before conducting experiments that generate chemical wastes.

Reagents that can deteriorate should be controlled by periodic inspection of chemical stocks by the laboratory technician particularly for the following types of chemicals: water-reactive chemicals, pyrophoric chemicals and peroxide-forming chemicals.

Reagent labelling should be maintained by individual workers and monitored periodically by the laboratory technician.

Orphan reaction mixtures should not be left in the laboratory. All workers must ensure that none of their reaction mixtures, solutions or samples are left in the laboratory after they terminate their work in the laboratory. This applies to all workers but is particularly relevant to undergraduate project students and to postgraduate Msc and PhD students who may only be working in the laboratory over a period of weeks, months or a few years.

7.2 Identification

Individual workers should decide if a material is no longer required and ought to be disposed of. Recycling or recovering of material should be considered. The hazard of the material to be disposed should be assessed (indeed this should be done before the generation of the waste). In the case of materials whose identity is not known the laboratory staff should be consulted. In any event, laboratory staff must be notified of any proposed disposal of radioactive material, material containing asbestos, explosive or potentially explosive material, DEFRA licenced materials and of major spillages.

7.3 Classification, Temporary Storage & Ethical & Responsible Disposal

Irrespective of the notes that follow, no material should be either poured down sinks or disposed of via waste bins unless it is clearly established that such disposal complies with local regulations - see for example guidelines from the Greater Manchester Waste Disposal Authority and guidance from North West Water. In any event, unless they are present only in acceptable trace concentrations, chemicals on the UK Government's Red List should always be disposed of through a reputable waste contractor.

If the waste is derived from material imported under a DEFRA Plant Health Licence then these materials must first be autoclaved (121°C / 15 psi) for 30 minutes OR incinerated, if safe to do so, and then subsequently disposed of at an authorised landfill. In the event that there are any concerns over this, the Persons Responsible for the DEFRA PHL must be consulted prior to any disposal.

Else, classification may follow the steps below (see diagram):

- (1) is the waste radioactive (Waste Category: 1), containing asbestos (WasteCat:2), explosive (WasteCat:3) or a spillage (WasteCat:4) ?
- (2) otherwise, is the waste non-chemical or chemical waste ?
- (3a) if not already classified and non-chemical waste, is the waste recyclable winchesters (WasteCat: 5), metal sharps (WasteCat: 6a), glass sharps (WasteCat: 6b) or non-hazardous waste (WasteCat: 7) ?
- (3b) if not already classified and chemical waste, is the waste a reaction mixture, gas cylinder (WasteCat:8) or other single reagents (WasteCat: 9) ?
- (4) if an otherwise unclassified reaction mixture, then is the waste a small volume of low-hazard liquid waste (WasteCat: 10) ?, a small volume of low-hazard solid waste (WasteCat: 11) ?, a halogenated solvent (WasteCat:12) ?, an unhalogenated-solvent (WasteCat:13) ?, liquid toxic waste compatible with existing stored liquid toxic waste (WasteCat:14) ?, solid toxic waste compatible with existing stored solid toxic waste (WasteCat:15) ?,
- (5) if not classified then miscellaneous hazardous waste (WasteCat:16) ?.

Waste Category 1: Hazardous waste: radioactive

Classification: Radioactive or suspected radioactive material.

Temporary storage: Contact The University's Radiological Protection Service (contact as of November 1999 is David Prime x 6798) who can provide advice and arrange for disposal. bags for temporary storage and will arrange for removal.

Ethical & responsible disposal: Such waste will be removed by The University's Radiological Protection Service, who arrange ethical and responsible disposal.

Waste Category 2: Hazardous waste: asbestos

Classification: Material, including gauzes, insulating gloves and insulating mats, containing asbestos or suspected of containing asbestos.

Temporary storage: Upon identification of such waste, immediately contact The University's Estates & Services (contact as of November 1999 is David Brown x

4946) who can provide advice, protective clothing, the appropriate red hazard labelled bags for temporary storage and will arrange for removal.

Ethical & responsible disposal: Such waste will be removed by The University's Estates & Services, who arrange ethical and responsible disposal.

Waste Category 3: Hazardous waste: explosive

Classification: Explosive or potentially explosive materials, including peroxidisable chemicals.

Temporary storage: Obtain advice from DAC-COSHH or The University's Health & Safety Services.

Ethical & responsible disposal: Arrangements for the disposal of such waste will depend upon the nature of the material.

Waste Category 4: Hazardous waste: Spillage

Classification: Material that has been spilt in the laboratory, for example on floors or benches or in fumehoods.

Temporary storage: The spillage should be immediately cleaned up according to procedures outlined in the relevant COSHH risk assessment. Neutralising material for acid and caustic spillages are stored near the main entrance to room 1.18. The waste material collected should then be reclassified.

Ethical & responsible disposal: Dispose of according reclassification.

Waste Category 5: Recyclable non-hazardous glass reagent bottles

Classification: Empty and cleaned Winchester or similar reagent bottles from Fisons or BDH or similar suppliers.

Temporary storage: These bottles should be disposed of promptly and not stored in the laboratory for more than a day.

Ethical & responsible disposal: Wichesters which are plastic-coated (e.g Safebreak) should be taken to collection point in Solvent Stores in the Department of Chemistry. Winchesters without such coatings should be disposed of via The University's glass recycling bins. In both cases it is impertative that the bottles be thoroughly cleaned before disposal.

Waste Category 6: Hazardous wastes: sharps

Classification: Clean (a) broken or unbroken glass or (b) metals that present a sharps-hazard. Sharps contaminated with hazardous substances should be classified as miscellaneous waste and handled accordingly.

Temporary storage: With care and using gloves for protection against sharps, safely transfer to the designated sharps waste bins - please separate (a) glass sharps and (b) metal sharps. Replacement bins for metal sharps can be obtained from The University's Estates & Services (Campus Cleansing). Contact as of November 1999 is Brian Dunbar x 2246. No sharps should be disposed of via ordinary waste paper bins.

Ethical & responsible disposal: These bins are emptied from time to time by laboratory staff and taken to a collection point from where they are collected and disposed of by The University's Estates & Services.

Waste Category 7: Non-hazardous solid waste

Classification: Clean plastic bottles or clean paper, plastic, polystyrene or similar packaging. Cleaned weighing boats, stoppers. Non-hazardous solid chemicals suitably

marked and packaged to prevent accidental generation of inhalable dusts during disposal by the worker, cleaning staff or any persons likely to be involved in the ultimate disposal of the waste.

Temporary storage: Small volumes may left in the waste bins near the entrance to rooms 1.18 & 1.20. Larger volumes should be safely transported to the large bins outside the NE corner of the building.

Ethical & responsible disposal: Small volumes left in the waste bins are collected on a daily basis by cleaners and understood to be transferred to the large bins outside the building. All this waste is then understood to be transferred by The University's Estates & Services to landfill.

Waste Category 8: Hazardous waste: recyclable gas cylinders

Classification: Gas cylinders which are no longer required to be used or are nearly empty and require refilling.

Temporary storage: As for full gas cylinders in laboratory. Unused or empty cylinders should be stored in the gas cylinder storage facility outside the NE corner of the building.

Ethical & responsible disposal: The user must make arrangements for the gas cylinders to be collected by the company (e.g. BOC) from which they were hired. In the event of such collection not being possible then the user must make suitable alternative arrangements.

Waste Category 9: Hazardous waste: single chemicals in a suitable storage container

Classification: Unused chemicals that are no longer required and which are still packaged in their original container or a suitable replacement container.

Temporary storage: Store as for other reagents according to the guidelines above, but clearly label the container "FOR DISPOSAL" and inform the laboratory staff.

Ethical & responsible disposal: Laboratory arrange for the annual or twice-annual removal and subsequent ethical & responsible disposal of this waste by a reputable waste disposal company at cost.

Waste Category 10: Non-hazardous liquid waste

Classification: Aqueous solutions devoid of hazardous or potentially hazardous solutes or containing such solutes at concentrations so low (less than 1 mg/l for most non-radioactive wholly inorganic solutes; for mercury a concentration of less than 0.2 mg/l is required for this classification) with a pH between 6 and 8 and with low total suspended solids and complying with local regulations for disposal to foul sewer.

Temporary storage: Such waste should not be stored.

Ethical & responsible disposal: Only having certainly established that the waste is near neutral pH and complies with local regulations, then this waste may be disposed via the sinks to the foul sewer with dilution by a excess of water. No more than 500 ml of such waste should be disposed of by any worker in one day by this method.

Waste Category 12: Hazardous waste: halogenated organic solvents

Classification: Any solution containing at least 1% of halogenated organic solvents and negligible non-halogenated solvents.

Temporary storage: Store as for other reagents according to the guidelines above, but clearly label the container "WASTE HALOGENATED SOLVENTS" and inform the

laboratory staff. Do not store large (> 500 ml) volumes of such solvents for longer than 3 months in the laboratory.

Ethical & responsible disposal: You are expected to make your own arrangements for the disposal of such waste. You may wish to consult with those responsible for the Organic Laboratory.

Waste Category 13: Hazardous waste: non-halogenated organic solvents

Classification: Any liquid containing at least 1% of non-halogenated organic and negligible halogenated organic solvents. Includes acetic acid.

Temporary storage: Store as for other reagents according to the guidelines above, but clearly label the container “WASTE NON-HALOGENATED SOLVENTS” and inform the laboratory staff. Do not store large (> 500 ml) volumes of such solvents for longer than 3 months in the laboratory.

Ethical & responsible disposal: You are expected to make your own arrangements for the disposal of such waste. You may wish to consult with those responsible for the Organic Laboratory.

Waste Category 14: Hazardous wastes: toxic liquid inorganic waste

Classification: Small volumes of aqueous solutions containing toxic or very toxic solutes at levels sufficiently high to be unable to be classified as non-hazardous waste, with a pH within 3 units of neutral and not containing potential explosive or gas generating components. Materials that potentially might generate hydrogen sulfide or arsine gas are explicitly excluded.

Temporary storage: Check to ensure that the waste is compatible with chemicals already poured into the designated toxic liquid inorganic waste vessel; if it is then carefully transfer to this vessel but not above the maximum level indicated and complete the appropriate disposal log, if not then treat as hazardous waste: miscellaneous. Advise the laboratory staff if the waste vessel is full or is nearly full.

Ethical & responsible disposal: Laboratory staff arrange for the annual or twice-annual removal and subsequent ethical & responsible disposal of this waste by a reputable waste disposal company at cost.

Waste Category 15: Hazardous wastes: toxic solid inorganic waste

Classification: Small quantities of toxic reaction products that cannot readily and safely be dissolved in aqueous solution or made non-hazardous. Contaminated gloves, wipes and papers.

Temporary storage: Check to ensure that the waste is compatible with chemicals already transferred into the designated toxic solid inorganic waste vessel; if it is then carefully add to this vessel but not above the maximum level indicated and complete the appropriate disposal log, if not then treat as hazardous waste: miscellaneous. Advise the laboratory staff if the waste vessel is full or is nearly full.

Ethical & responsible disposal: Laboratory staff arrange for the annual or twice-annual removal and subsequent ethical & responsible disposal of this waste by a suitable waste disposal company at cost.

Waste Category 16: Hazardous waste: miscellaneous

Classification: All wastes not classifiable in any of the previous categories.

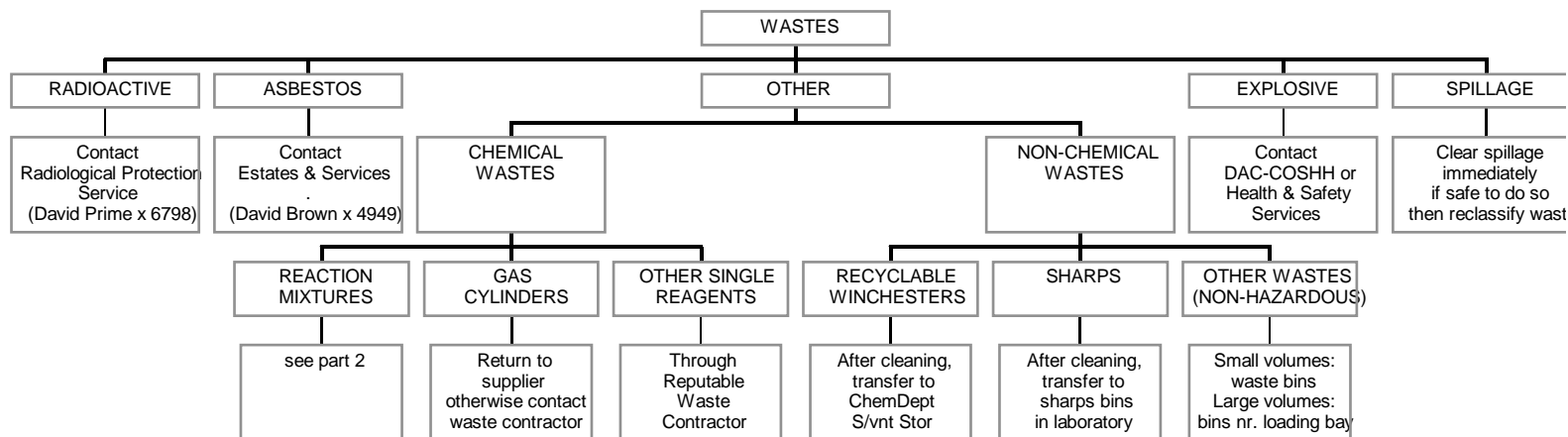
Temporary storage: Store as for other reagent mixtures and chemicals according to the guidelines above, but clearly label the container “WASTE” as well indicating the

nature of the waste and the associated hazards. You must ensure that incompatible chemical wastes are not mixed in any such waste vessel or that large (> 500 ml) volumes of such wastes are stored for longer than 3 months. All such waste vessels must be dated and a log kept of the materials transferred into them. Inform the laboratory staff.

Ethical & responsible disposal: You are expected to make your own arrangements for the disposal of such waste. You may wish to consult with those responsible for the Organic Laboratory or the staff in this laboratory.

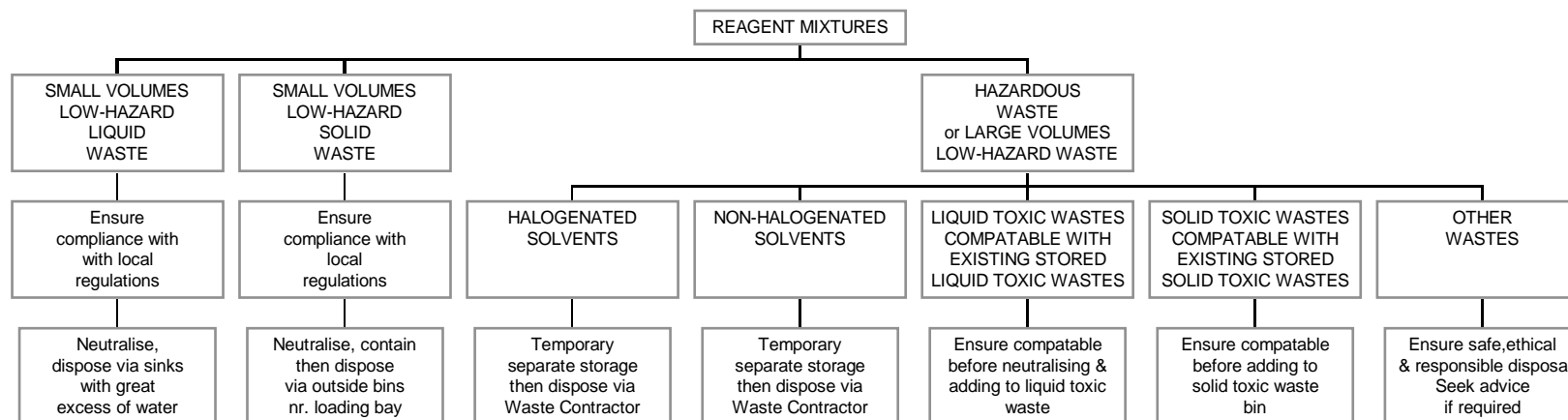
Laboratory Wastes: Classification & Disposal

Part 1 of 2



Laboratory Wastes: Classification & Disposal

Part 2 of 2



A1: LABORATORY INDUCTION CHECKLIST

NAME OF INDUCTEE

SUPERVISOR

Inductee has read School Health & Safety Code of Practice including Laboratory Code of Practice ?

Inductee has been made aware of:

requirement to act responsibly at all times and to comply with all the regulations laid out in the policy documents noted above ?

DEFRA Plant Health Licence requirements ?

requirement to wear safety glasses at all times ?

requirement to wear a suitable laboratory coat at all times ?

requirement to lodge a completed COSHH risk assessment form before starting any work and their legal responsibilities ?

requirement to log in before commencing any work and to log out when completing work for the day ?

particular hazards, including

- hydrofluoric acid ?
- compressed gases ?
- corrosive substances including strong acids ?
- flammable solvents ?
- toxic chemicals & waste ?
- others as specified ?

fire exits and emergency evacuation procedures ?

location of first aiders, emergency eye wash and calcium gluconate gel ?

location of materials for cleaning up acid and caustic spills ?

requirement to store chemicals safely and, in particular to avoid mixing incompatible chemicals ?

requirement to arrange ethical and responsible disposal of all chemical wastes they generate & to log waste disposals ?

NAME OF INDUCTOR

SIGNATURE & DATE

A4: LOG OF CHEMICALS DISPOSED OF FROM LABORATORY 1.18

Date	Chemical/ Substance	Quantity	Hazard Class	User	Disposal Route

A5: COSHH COMPLIANCE CHECK-LIST: STORAGE

SHELF STORAGE

Are large bottles stored on shelves < 1 m from the floor ?	Y	N	X	C
Are all chemicals below eye level ?	Y	N	X	C
Do no reagent bottles protrude over shelf edges ?	Y	N	X	C
Have empty bottles been removed ?	Y	N	X	C
Are the chemicals not overcrowded ?	Y	N	X	C
Are the shelves clean & free of dust and chemical contamination ?	Y	N	X	C

STORAGE CONTAINERS

Are storage containers inspected regularly for rust, corrosion or leakage ?	Y	N	X	C
Are damaged containers removed or repaired immediately ?	Y	N	X	C
Are chemicals kept in air-tight bottles ?	Y	N	X	C
Are carboys used for storage of chemical solutions ?	Y	N	X	C
Are carboy spigots leak-tight and drip-free ?	Y	N	X	C

LABELLING

Are the labels readable and free of encrustation or contamination ?	Y	N	X	C
Are the labels firmly attached ?	Y	N	X	C
Do the labels display appropriate warnings ?	Y	N	X	C
Do the labels display date of receipt and anticipated disposal date ?	Y	N	X	C
Do the labels indicate the user responsible ?	Y	N	X	C

HOUSEKEEPING

Are unlabelled containers or undesirable chemicals discarded properly ?	Y	N	X	C
Are chemicals in storage cabinets and on shelves inspected for for decomposition on a regular basis and a log kept ?	Y	N	X	C
Are unused chemicals never returned to stock bottles ?	Y	N	X	C
Are waste receptacles clearly marked and their locations indicated ?	Y	N	X	C
Are environmentally safe disposal methods arranged for dangerous waste chemicals ?	Y	N	X	C

A6: INFORMATION SOURCES

Compliance with this standard operating procedure requires an understanding of the principles of COSHH, risk assessment and chemicals hazards as well as access to data on the hazards of specific substances.

In addition to materials obtainable from the HSE (Health & Safety Executive), the RSC (Royal Society of Chemistry) and The University (notably health & safety policy and advisory notices), useful information sources include:

BREThERICK, L. (1990) Bretherick's Handbook of Reactive Chemical Hazards, 4th Edition, Butterworths, 2005pp.

FURR, A.K. (1990) CRC Handbook of Laboratory Safety, 3rd Edition, CRC Press, Boca Raton, ISBN - 0 8493 0353 2, 704pp.

IUPAC-IPCS (1992) Chemical Safety Matters, WHO/IUPAC. 284pp.

KEITH, L.H. and WALTERS, D.B. (1985) compendium of Safety Data Sheets for Research and Industrial Chemicals. Parts I, II & III. VCH Publishers, ISBN 0 - 89573 - 313 - 7.

LENGA, R.E. (1985) Sigma-Aldrich Library of Chemical Safety Data. 1st Edition, 1999pp.

which are mostly to be found in the reference section (1st Floor) of the John Rylands Library.

Useful websites include:

<http://www.intranet.seaes.manchester.ac.uk/school/healthandsafety/chemicalsafety/>

<http://physchem.ox.ac.uk/MSDS/>

[access to material safety data sheets, lists of peroxidisable, explosive and incompatible chemicals, risk phrases, safety phrases, suitability of glove materials]

<http://www.esd.uga.edu/ess/>

[access to information including incompatible chemicals and storage]

<http://www.orcbs.msu.edu/chemical/>

[access to information on chemical safety including storage and disposal]

<http://www.hse.uk/>

[Health & Safety Executive]